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2.6 Inequalities and Bounds; 2.7 Markov Chains; 2.7.1 The Memoryless Property; 2.7.2 State Transition Matrix; 2.7.3 Steady-State Distribution; 2.8 Random Processes; 2.8.1 Definition: Ensemble of Functions; 2.8.2 Stationarity and Ergodicity; 2.8.3 Markov Processes; References; Exercises; 3 Application of Birth and Death Processes to Queueing Theory; 3.1 Elements of the Queueing Model; 3.2 Little's Formula; 3.2.1 A Heuristic; 3.2.2 Graphical Proof; 3.2.3 Basic Relationship for the Single-Server Queue; 3.3 The Poisson Process; 3.3.1 Basic Properties; 3.3.2 Alternative Characterizations of the Poisson Process; 3.3.3 Adding and Splitting Poisson Processes; 3.3.4 Pure Birth Processes; 3.3.5 Poisson Arrivals See Time Averages (PASTA); 3.4 Birth and Death Processes: Application to Queueing; 3.4.1 Steady-State Solution; 3.4.2 Queueing Models; 3.4.3 The M/M/1 Queue-Infinite Waiting Room; 3.4.4 The M/M/1/L Queue-Finite Waiting Room; 3.4.5 The M/M/S Queue-Infinite Waiting Room; 3.4.6 The M/M/S/L Queue-Finite Waiting Room; 3.4.7 Finite Sources; 3.5 Method of Stages; 3.5.1 Laplace Transform and Averages; 3.5.2 Insensitivity Property of Erlang B; 3.5.3 The Erlang B Blocking Formula: N Lines, Homogeneous Traffic; References; Exercises; 4 Networks of Queues: Product Form Solution; 4.1 Introduction: Jackson Networks; 4.2 Reversibility: Burke's Theorem; 4.2.1 Reversibility Defined; 4.2.2 Reversibility and Birth and Death Processes; 4.2.3 Departure Process from the M/M/S Queue: Burke's Theorem; 4.3 Feedforward Networks; 4.3.1 A Two-Node Example; 4.3.2 Feedforward Networks: Application of Burke's Theorem; 4.3.3 The Traffic Equation; 4.4 Product Form Solution for Open Networks; 4.4.1 Flows Within Feedback Paths; 4.4.2 Detailed Derivation for a Two-Node Network

Sommario/riassunto

This book covers at an advanced level mathematical methods for analysis of telecommunication networks. The book concentrates on various call models used in telecommunications such as quality of service (QoS) in packet-switched Internet Protocol (IP) networks, Asynchronous Transfer Mode (ATM), and Time Division Multiplexing (TDM). Professionals, researchers, and graduate and advanced undergraduate students of telecommunications will benefit from this invaluable guidebook. An Instructor's Manual presenting detailed solutions to all the problems in the book is available online from the Wil
